



US Army Corps
of Engineers®

*Sediment Evaluation
Framework (SEF):*
**Overview
and
NWD 13 Mar 2007 Memo**



US Army Corps
of Engineers®

Purpose:

To give a brief overview of the
Sediment Evaluation Framework



US Army Corps
of Engineers®

Overview

- The SEF provides a framework for the assessment and characterization of freshwater and marine sediments in Idaho, Oregon, and Washington
- It is generally applied to most dredging projects, but other projects may also require SEF review if:
 - The project is one where the District is processing a Standard Permit (incl. LOPs)
 - The project is eligible for a Nationwide permit but is located in a known Superfund Site



US Army Corps
of Engineers®

Overview: SEF Regulatory Authorities

- RHA (§10); CWA (§404); MPRSA (§102, 103)
- ESA (16 USC 1531-1544)
- MSA (16 USC 1801-1883)
- State §401 Programs
- CZMA (16 USC 1451-1456)



US Army Corps
of Engineers®

Overview: Who Conducts the SEF Review?

- The Project Review Group (PRG) is the interagency team tasked with reviewing Portland District dredging projects for consistency with the SEF.
- The PRG makes management decisions for the dredging project, disposal of the dredged material, and management of the newly exposed surface.
- Member agencies include the EPA, Corps, NOAA-NMFS, USFWS, WA Dept. of Ecology, and OR-DEQ.



US Army Corps
of Engineers

Management Area Rankings

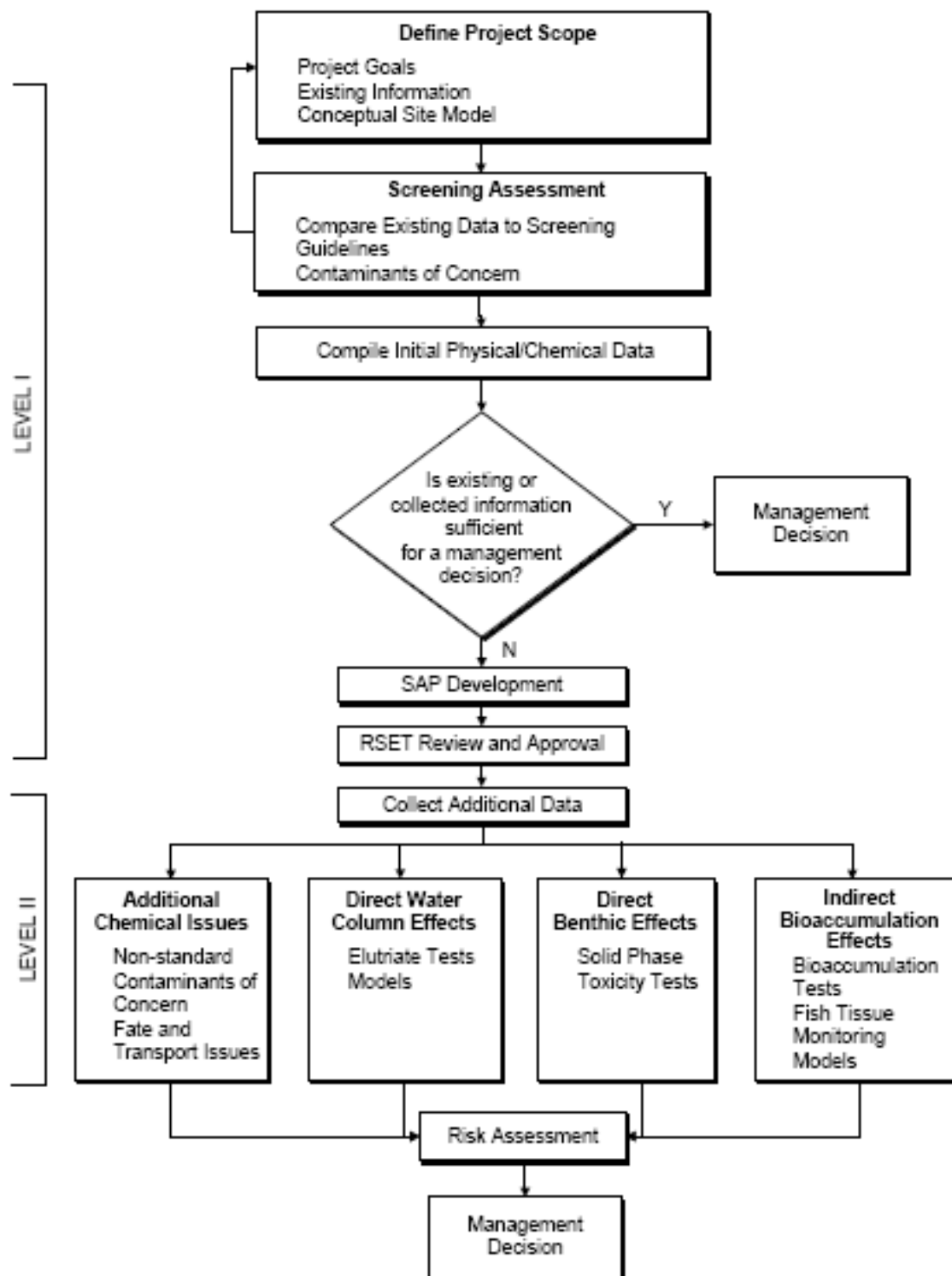
Dictates how many dredged material management units (DMMUs) and samples are necessary to adequately characterize dredged material and the new surface material based on particle size distribution, known and potential contamination sources, proximity to those sources, etc.

Ranking	Parameters
Exclusionary	Available data indicate coarse-grained sediment with at least 80 percent sand retained in a No. 230 sieve and a total organic carbon content of less than 0.5 percent TOC. Locations sufficiently removed from potential sources of sediment contamination based on historical information and/or best professional judgment. Typical locations include the mouth and mainstem channel of the lower Columbia River.
Low	Available data indicate low concentrations of CoCs and/or no significant response in biological tests. Locations with higher percentage of finer-grained sediments and organic material but few sources of potential contamination. Typical locations include adjacent entrance channels, rural marinas, navigable side sloughs, and small community berthing facilities.
Low-Moderate	Available data indicate a "low" rank may be warranted, but data are not sufficient to validate the ranking.
Moderate	Available data indicate moderate concentrations of CoCs in sediments in a range known to cause adverse response in biological tests. Locations where sediments are subject to several sources of contamination, or where existing or historical use of the site has the potential to cause sediment contamination. Typical locations include urban marinas, fueling, and ship berthing facilities; areas downstream of major sewer or stormwater outfalls; and medium-sized urban areas with limited shoreline industrial development.
High	Available data indicate high concentrations of CoCs in sediments and/or significant adverse responses in at least one of the last two cycles of biological tests. Locations where sediments are subject to numerous sources of sediment contamination, including industrial runoff and outfalls, or where existing or historical use of the site has the potential to cause sediment contamination. Typical locations include large urban areas and shoreline areas with major industrial development.



US Army Corps
of Engineers

Level I and II Review Process





US Army Corps
of Engineers®

Overview: Level I Process

- Level I Review
 - Identify project scope
 - Review existing information
 - Screen data, ID chemicals of concern (CoCs), develop CSM → ID **management area ranking**; make management decision
 - If previous data lacking, and CoCs are suspected, then Level II review necessary



US Army Corps
of Engineers®

Overview: Level 1 Initial Data Requirements- Site History

- For all projects identified as needing to go through the SEF process it is the Corps project manager's responsibility to provide site history information to the PRG for their review
- If the applicant did not provide this information in the permit application, the Project Manager will obtain from the applicant
- If the applicant cannot provide the information, the Project Manager will need to obtain this information in-house and via available online resources



US Army Corps
of Engineers®

Overview: Level 1 Initial Data Requirements- Site History (cont.)

- 1) A map showing the project site location (include river mile if applicable), layout, existing storm drainages and outfalls, and special aquatic sites (wetlands).
- 2) Description of project including volumes, acreage, materials, methods, and equipment.
- 3) Current project area land uses and history of site ownership and prior land uses.
- 4) Current and prior adjacent property land uses, especially those properties upgradient or upstream/current.
- 5) Site characteristics that could affect movement of contaminants (i.e. prop wash, barge/ferry traffic, Port traffic, dredged navigational channels, bar scalping, instream dredging sites)
- 6) Outfalls information, such as construction year, type, flow volume (capacity), and NPDES data.



US Army Corps
of Engineers®

Overview: Level 1 Initial Data Requirements- Site History (cont.)

- 7) Industrial processes at or near the site and hazardous substances used/generated at these sites.
 - Specific information on Environmental Cleanup, brownfields, leaking storage tanks, etc. can be found at <http://www.oregon.gov/DEQ/>.
 - Information on one-time or short-term toxic substance releases can be found at: <http://www.oregon.gov/DHS/ph/envtox/programs.shtml>.
- 8) CERCLA-listed site information. See <http://www.epa.gov/superfund/sites/npl/or.htm> and information listed in 3) above.
- 9) Spill events. These sites may provide information:
<http://www.deq.state.or.us/pubs/factsheets.htm>
<http://www.fws.gov/oregonfwo/Contaminants/>
- 10) Results of any previous sampling and/or testing.
- 11) Any dredging activity and data/information from that activity.
- 12) Conceptual Site Model.



US Army Corps
of Engineers®

Overview:

Level 1 Initial Data Requirements- Conceptual Site Model (CSM)

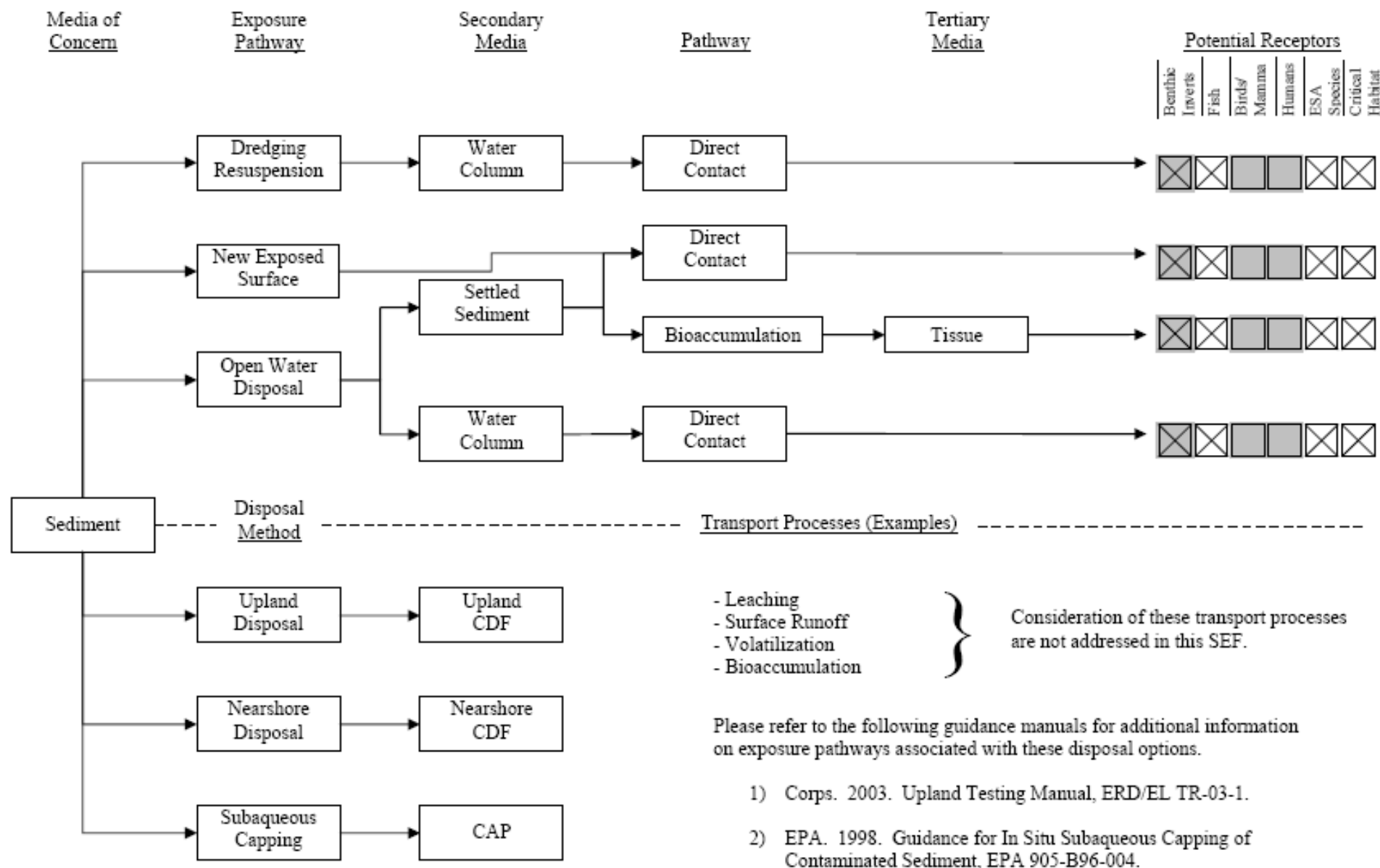
- CSM identifies exposure pathways (for chemicals of concern) to determine site-specific assessment questions
- A CSM identifies:
 - Exposure pathways from sediment (new surface, dredging residuals, OW disposal)
 - Secondary media (water column, settled sediment)
 - Pathways of exposure (mammals, fish, macro-inverts.): direct contact; bioaccumulation



US Army Corps
of Engineers

Example of a Conceptual Site Model Mainstem of the Columbia River Federal Dredging Project

Figure 1: Dredging Conceptual Site Model.





US Army Corps
of Engineers®

Overview:

Level I Information Result- Project Ranking and Testing

- Each project area is assigned a risk-based ranking for chemicals of concern (exclusionary, low, low-moderate, moderate, high)
- The PRG will review available site history and the CSM to determine the SEF ranking
- the PRG will review available data and use best professional judgment to assign a rank
- Both the project ranking and the proposed volume dredged dictate the need to test



US Army Corps
of Engineers

Overview: Level I Information Result- No-Test Volumes for Small Projects

Table 5-3. “No Test” Volumes for Small Projects

Ranking	“No Test” Volume
Low	Less than 10,000 cy
Low-Moderate	Less than 1,000 cy
Moderate	Less than 1,000 cy
High	Not Applicable
Note: cy = cubic yards	

For small projects, the cost of testing must be balanced against the environmental risks posed by a very small volume of dredged material. Small volumes generally represent low potential risk that unacceptable adverse effects will result at the disposal site from the specific and/or cumulative discharges.



US Army Corps
of Engineers®

Overview: Level I Information- Sampling and Analysis Plan

- If Level 1 site history and conceptual site model not adequate, or if small project no-test volumes exceeded, then Sampling and Analysis Plan (SAP) must be prepared.
- SAP must be designed to characterize both dredged material and post-dredge surface.
- Info includes:
 - Site history information and CSM
 - Project rank and volume of dredged material (to determine no. and location of samples)
 - Sampling and analysis procedures, analyte list, personnel responsibilities, etc.
 - Biological testing



US Army Corps
of Engineers®

Overview: SEF Level II Process

- Level II Review
 - Sample per SAP, prepare sediment characterization report (SCR), and make mngmt. decision if CoCs fall w/in the Screening Levels (SLs) or:
 - If CoCs exceed SEF SLs, final risk assessment/ final management decision made after Special Evaluation(s):
 - Elutriate test models
 - Direct benthic effects (bioassays)
 - Bioaccumulation tests



US Army Corps
of Engineers®

Overview: Common Acronyms and Definitions

- CDF: confined (upland) disposal facility
- CoCs: chemicals of concern
- CSM: conceptual site model
- cy: cubic yards
- DMEF: Dredged Material Evaluation Framework – precursor to the SEF



US Army Corps
of Engineers

Overview: Common Acronyms and Definitions (cont.)

DMMU: dredged material management unit - a sampling unit, the volume of which is dictated by the ranking of the material to be dredged, typically expressed in cy and area (acres).

With increased risk of contamination, the DMMU volume necessary to adequately characterize the contaminated site project decreases (i.e., the number of samples increases)

Ranking	Heterogeneous	Homogeneous
(Volumes in cubic yards)		
Exclusionary	NA	NA
Low	50,000	100,000
Low-Moderate	35,000	70,000
Moderate	20,000	40,000
High	up to 5,000	up to 10,000
Notes: 1. Volumes are based upon barge load capacity of 5,000 cubic yards. 2. The volume for a DMMU ranked high is based upon the ability to discretely handle each barge load of material separately. Subsequent DMMU volumes are based upon the best professional judgment of RSET and a need to provide a general guide based upon volume. 3. NA = not applicable		



US Army Corps
of Engineers®

Overview: Common Acronyms and Definitions (cont.)

- Dredge prism: the material to be dredged
- Dredging residuals: contaminated sediment found at the post dredging surface of the sediment profile, either within or adjacent to the dredging footprint
- MDL: method detection limit - minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero
- mg/kg = parts per million (ppm)
- $\mu\text{g/kg}$ = parts per billion (ppb)
- NSM: new surface material, aka the leave surface - the surface material exposed after dredging



US Army Corps
of Engineers®

Overview: Common Acronyms and Definitions (cont.)

- PAHs: polycyclic (polynuclear) aromatic hydrocarbons - molecules made up of three or more benzene rings, found in substances such as crude oil, coal, coal tar pitch, creosote, and roofing tar
- PCBs: polychlorinated biphenyls - industrial compounds produced by chlorination of biphenyl, an environmental pollutant that accumulates in animal tissue with adverse effects; primarily used in the electrical industry for industrial transformers and capacitors; also used as plasticizers in sealants, caulking, synthetic resins, rubbers, paints, waxes, and asphalts; and as flame retardants in lubricating oils



US Army Corps
of Engineers®

Overview: Common Acronyms and Definitions (cont.)

- SAP: sampling and analysis plan
- SCR: sediment characterization report
- SL: screening level – thresholds developed for the standard list of CoCs (SEF Table 7-1) which are designed to be protective of direct biological effects to benthic and aquatic organisms
- SL1: screening level 1 corresponds to a concentration below which adverse effects to benthic organisms would not be expected,
- SL2: screening level 2 corresponds to a concentration at which minor adverse effects may be observed in more sensitive groups of benthic organisms
- SQL: sample quantitation limit – lowest concentration at which an analyte can be detected and measured precisely (needs to be 3 to 5 times the MDL)



US Army Corps
of Engineers®

Questions?

- Contact your Regulatory Project Manager, or
- James McMillan, SEF Point of Contact @ 503.808.4376